

Operator's Manual

AE/LZT 123 1868 R10A

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The Future of Mobile Radio



EDACS[®]/ProVoice[™] LPE-200 Portable Radio

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Electronics

MAACOM

NOTE!

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

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INTRODUCTION

This manual describes how to use the EDACS®/ProVoice™ LPE-200 Portable Radio. The LPE-200 is a synthesized, microprocessor-based, high performance portable FM radio providing reliable two-way communications in the Enhanced Digital Access Communications System (EDACS) or ProVoice trunking environment and conventional communication systems.

In the trunked system mode, the user selects a communications system and group. In this mode, channel selection is transparent to the user and is controlled via digital communication with the system controller. This provides advanced programmable features and fast access to communication channels.

In the conventional mode, the user selects a channel and directly communicates on that channel. In this mode, a system refers to a set of channels. A channel is a transmit/receive radio frequency pair.

Advanced hardware and software technology enables this radio to support all advanced EDACS and ProVoice radio features and multiple communications modes including digital. Depending on the customer's needs, the LPE-200 is available in both System and Scan Modes.

Some key features include:

- Data capable
- Automatic power control for extended battery life

- Up to 800 system/group combinations and up to 200 conventional channels
- Translucent keys

USER INTERFACE

The LPE-200 operating controls are located on the radio's front, top and left panels. A 6-button (scan model) or 15-button (system model) keypad, Liquid Crystal Display (LCD), microphone and speaker are on the front panel. The top panel houses a rotary SYSTEM/GROUP/ CHANNEL knob, POWER ON-OFF/VOLUME control knob and an EMERGENCY button. An OPTION button, CLEAR/MONITOR button and the Push-To-Talk (PTT) button are all located on the left side panel. The Universal Device Connector (UDC) is located on the right panel and is used while programming the radio and for accessory connection. A battery release button is located on the back adjacent to the PPT button.

The display has three, twelve character alphanumeric lines used to show the operational mode of the radio. A back light illuminates the display and the keypad for nighttime use. An LED is located on the front top edge of the radio. Red indicates transmit.



**Figure 1 - LPE-200 Radio
(Scan Model Shown)**



**Figure 2 - LPE-200 Radio
(System Model Shown)**

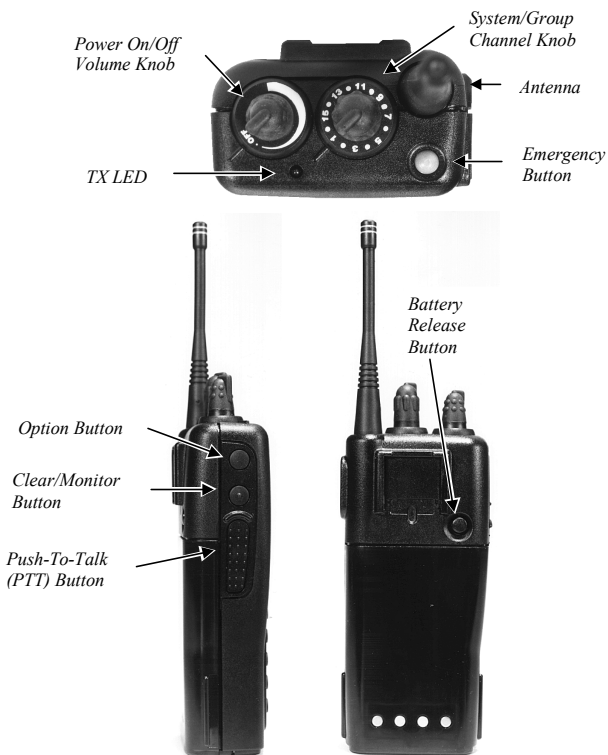


Figure 3 – Top, Back and Left Panel Views

BUTTONS AND KNOBS

This section describes the primary function of the button and knob controls. Other functions associated with these controls are detailed in later sections.

SYSTEM/ GROUP/ CHANNEL KNOB	Selects systems or groups/channels (depending on programming). This is a 16 - position rotary knob. See SYSTEM/GROUP/CHANNEL SELECTION for details.
--	---

Note: The radio is supplied with a mechanical stop which can, if desired, limit the positions accessed. If the knob will not access all positions do not force it.

POWER ON-OFF/ VOLUME KNOB	Applies power to the radio and adjusts the receiver's volume. Rotating the control clockwise applies power to the radio. A single alert tone (if enabled through programming) indicates the radio is operational.
--	---

Rotating the control clockwise increases the volume level. Minimum volume levels may be programmed into the radio to prevent missed calls due to a low volume setting. While adjusting the volume the display will momentarily indicate the volume

level (i.e. **VOL = 31**). The volume range is from a minimum programmed level of zero (displayed as **OFF** in the display) up to 31 which is the loudest level.

**EMERGENCY/
HOME
BUTTON**

The EMERGENCY/HOME button is used to automatically select a pre-programmed Group/System by pressing and holding for a programmed duration. It can also be used to declare emergency by pressing and holding for programmed duration. The button must be pre-programmed for either operation, not both.

**OPTION
BUTTON**

Programmable per system.

**CLEAR/
MONITOR
BUTTON**

Serves several purposes depending on the operating mode. In trunked mode, the CLEAR/MONITOR button exits the current operation and removes all displays associated with it. The radio and display then return to the group receive state. In conventional mode, pressing this button unmutes the receiver so activity on the selected channel can be monitored. When pressed and held for approximately 3 seconds, this button toggles conventional channel decoding/encoding (Channel Guard, Digital Channel Guard) on and off if programmed for the selected channel.

**PUSH-TO-
TALK BUTTON
(PTT)**

Enables the radio's transmitter for voice communication. Releasing PTT returns the radio to the receive mode.

KEYPAD

The keypad layout has a total of 6 or 15 keys. The keys have special functions and are labeled as such using a symbol or abbreviated word describing its primary function. Numeric entry is a secondary function of the keys. Each key is described below.

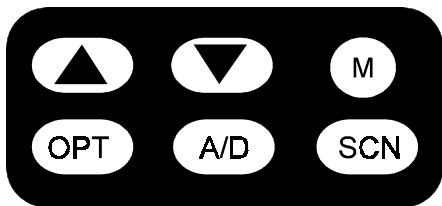


Figure 4 - Keypad (Scan Model)

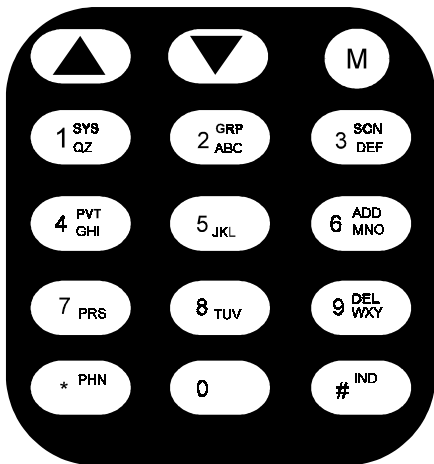










Figure 5 - Keypad (System Model)

Standard Functions

-  Primary function - changes the system or group/channel (depending on programming).
-  Secondary function - used to scroll through items within a list. Press , to scroll in increasing order,  to scroll in decreasing order.

-  Primary function - accesses the menu list. This is a list of additional features that are not available directly from the keypad. See MENU for details.

Secondary function - activates a selected item within a list. After the menu list is accessed, select a menu item from the list via  or  and activate it with this key. Once activated,  continues its secondary function for activating a selected parameter setting until the radio returns to its normal receive state.

Scan Model

OPT

User defined.

A/D

Adds or deletes selected groups or channels from the scan list of the currently selected system. See trunked and conventional scan section for details.

SCN

Toggles scan operation on and off.

System Model

1^{SYS}_{OZ}

Used to directly access systems via the keypad and to access system selection in increasing or decreasing order, or to select a set (bank) of systems. See SYSTEM/ GROUP/ CHANNEL SELECTION for details.

2^{GRP}_{ABC}

Used to directly access groups via the keypad and to access group selection in increasing or decreasing order, or to select a set (bank) of groups. See SYSTEM/ GROUP/ CHANNEL SELECTION for details.

3^{SCN}_{DEF}

Used to turn scan on and off.

4^{PVT}
GHI

Used to turn private encryption feature on and off.

6^{ADD}
MNO

9^{DEL}
WXY

Adds or deletes selected groups or channels from the scan list of the currently selected system. See trunked and conventional scan section for details. First press recalls current status. Second press adds or deletes.

*^{PHN}

Used to place a telephone call through the radio by selecting the telephone interconnect special call function. See Telephone Interconnect Calls for details.

#^{IND}







Used to call an individual or make an all-call. See Individual Call for details.

BUTTON AND KEYPAD REASSIGNMENT

Pre-programming the radio using the PC Programming Software permits the reassignment of button and keypad key functions. The EMERGENCY, OPTION, CLEAR/MONITOR and PTT buttons along with the front panel keypad keys can be reassigned different functions. For example, the (M) key could be assigned as the HOME key, the (OPT) key could be assigned as the talk-around function key, etc.

The operating procedures that follow assume that the buttons and keypad keys operate as marked. If they have been reassigned, Table 1 should be completed to show the new function(s). Substitute the new assigned keys when using the operating procedures.

Table 1 - Button and Key Assignments

STANDARD ASSIGNMENTS	REASSIGNMENT
OPTION (Side)	
CLEAR/MONITOR	
PTT	
EMERGENCY	
	
	
	
	
	
	

DISPLAY

The radio display is made up of 3 lines (Figure 6). Lines 1 and 2 contain eight alphanumeric character blocks and are used primarily to display system and group names. Line 1 also displays radio status messages. The 3rd line is used primarily to display radio status icons. All three lines are used to display menu options when in the menu mode. If programmed, the display backlighting will illuminate upon power up when radio controls are operated.

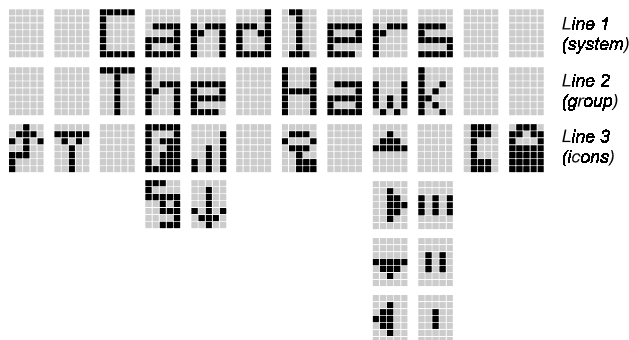
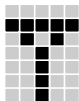


Figure 6 - Display

Radio Status Icons

Status icons are indicators that show the various operating characteristics of the radio. The icons show operating modes and conditions and appear on the third line of the display as follows:



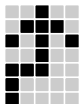
In trunked mode:

ON - indicates the radio is transmitting or receiving a call on the working channel.

FLASHING - indicates a call has been queued.

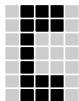
In conventional mode:

ON – indicates a call is being received.



ON - indicates the radio is transmitting.

Note: When operating in a trunked system, the radio may be programmed to automatically transmit (without pressing PTT) to maintain digital communication with the Trunked System. The transmit indicator will turn on whenever the radio is transmitting.



ON - indicates the radio is in the special call select/entry mode (Individual or Telephone Interconnect).

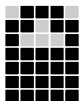


ON - indicates the selected group or channel is selected to transmit at low power.

OFF - indicates the selected group or channel is selected to transmit at high power.

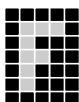


Auto Power mode automatically adjusts radio output power to optimize battery life.



Indicates battery voltage is getting low.

Note: When or in conjunction with **LOW BATT** message the radio will no longer transmit. The radio will automatically power down soon after this condition exists.



Indicates the EDACS is in the failsoft mode (if enabled through programming).



ON - indicates the group or channel is enabled to receive encrypted messages.

FLASHING - indicates an encrypted transmission is being received.



ON - indicates the scan mode is enabled (rotates clockwise).

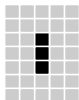
OFF - indicates SCAN is temporarily disabled (no status icon is present).



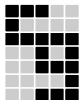
On - indicates selected group or channel is in scan list.



On - indicates selected group or channel is priority-two scan.



On - indicates selected group or channel is priority-one scan.



On - indicator for conventional channel is enabled with Channel Guard.

FLASHING - indicates Channel Guard is temporarily disabled.

Messages

During radio operation, various radio status messages can be displayed. The messages are described below.

<u>Message</u>	<u>Name</u>	<u>Description</u>
QUEUED	Call Queued	- Trunked mode only. Indicates the system has placed the call in a request queue.
SYS BUSY	System Busy	- Trunked mode only. Indicates the system is busy, no channels are currently available, the queue is full or an individual call is being attempted to a radio that is currently transmitting.
DENIED	Call Denied	- Trunked mode only. Indicates the radio or talkgroup is not authorized to operate on the selected system and/or talkgroup.
CC SCAN	Control	- Trunked mode only.

<u>Message</u>	<u>Name</u>	<u>Description</u>
	Channel Scan	Indicates the control channel is lost and the radio has entered the Control Channel Scan mode to search for the control channel. (Usually out of range indication.)
WA SCAN	Wide Area Scan	- Trunked mode only. Indicates the radio has entered the Wide Area Scan mode to search for a new system (if enabled through program-ming).
TALKARND	Talk-around	-Conventional mode only. Indicates the radio is operating on conventional channels in talk-around mode (no repeater).
SYSC ON	System Scan Features On	- Trunked mode only. Indicates the System Scan features are enabled.
SYSC OFF	System Scan Features Off	- Trunked mode only. Indicates the System Scan features are disabled.
LOW BATT	Low Battery	- Battery voltage has dropped below the point to where the radio is no longer able to transmit. The radio will still be able to receive calls until the battery is discharged beyond the point of operation upon which the

<u>Message</u>	<u>Name</u>	<u>Description</u>
		radio will automatically shutdown.
RXEMER	Receive Emergency	- Trunked mode only. Indicates an emergency call is being received. This message will be flashing on line two.
TXEMER	Transmit Emergency	- Trunked mode only. Indicates an emergency call has been transmitted on this radio. This message will be flashing on line two.
VOL=31	Volume Level	- Indicates the current volume level. The volume level display ranges from OFF (silent) to 31 (loudest).
WHC	Who Has Called (trunked mode only)	- ON - indicates an individual call has been received, but not responded to. The indicator turns OFF if the individual call mode is entered, the system is changed or the radio is turned off and back on.
UNKNOWN	Unknown ID	- Trunked mode only. Indicates an individual call is being received by an unknown radio ID.

Error Messages

If either of the following error messages is displayed, the radio was either programmed incorrectly or needs servicing:

DSP ERR **DSP ERR** or **DIG V ERR**
ERR=XXXX
(Power Up only)

UNIVERSAL DEVICE CONNECTOR (UDC)

The Universal Device Connector (UDC) provides connections for external accessories such as a headset or a speaker-microphone. When the radio is locked in a vehicular charger the UDC provides the audio and control connections between the radio and the vehicular charger. The UDC is also used to program and service the radio.

ALERT TONES

The LPE-200 radio also provides audible alert tones or "beeps" to indicate the various operating conditions. These alert tones can be enabled or disabled through programming.

Call Originate

A short mid-pitched alert tone sounds after keying the radio (Push-To-Talk button is pressed). This indicates the radio has been assigned a working channel or that the radio is transmitting on a conventional channel and voice communication may begin immediately.

Call Queued (Trunked Mode Only)

A high-pitched tone after pressing the PTT button indicates the system has placed the call request in the queue. The receiving unit(s) also hear the tones, indicating they will receive a call shortly. If the PTT button is released, the radio will autokey whenever a channel becomes available (see Autokey).

Autokey (Trunked Mode Only)

After being placed in queue (see called queued), the site calls the radio when a channel becomes available. At this point, the radio automatically keys the transmitter (autokey) for a short period to hold the channel. The radio sounds a mid-pitched tone when it is clear to talk; immediately press the PTT button to keep the assigned channel.

System Busy (Trunked Mode Only)

Three low-pitched beeps will be heard if: 1) the radio is keyed when the system is busy, 2) if no channels are available for sending the message, 3) if the call queue is full, 4) or if an individual call is being attempted to a radio that is transmitting. Releasing the PTT button and re-keying initiates a new channel request.


Call Denied (Trunked Mode Only)

If the radio is keyed and a low pitched tone is heard the radio is not authorized on the system or talk group selected.

Carrier Control Timer

If the programmed time for continuous transmission is exceeded, five short high-pitched warning tones followed by a long low-pitched tone will be heard. The transmitter will shut down shortly after hearing the alert, interrupting communications. Release and re-key the PTT button to maintain communications. This will reset the carrier control timer and turn the transmitter back on.

Low Battery Warning

A low-pitched tone is heard and  comes on indicating that the battery voltage is low. Double tones are then heard until the PTT or CLEAR button is pressed.

Low Battery Alert (Transmit Lockout)

If the radio is keyed and a double tone is heard as well as **LOW BATT** is displayed, the battery is discharged beyond the point where the radio will transmit. The radio will still be able to receive calls until the battery is discharged beyond the point of operation, after which the battery will need to be recharged to resume normal operation.

Key Press Alert

A short tone or "beep" sounds to indicate a key has been pressed. A short low-pitched tone indicates the key is not active in the current mode.

OPERATION

TURNING ON THE RADIO

1. Turn on the radio by rotating the POWER ON-OFF/VOLUME knob clockwise. A short alert signal (if enabled through programming) indicates the radio is ready to use.
2. The display shows the last selected system and group or a default system and group (depending on programming).
3. Adjust the POWER ON-OFF/VOLUME knob to the desired volume level.
4. Select the desired system and group (see system and group selection section). The display indicates the current system and group names.
5. The radio is now ready to transmit and receive calls.

NOTE

In the trunked environment, CC SCAN will be displayed if communication with the system's control channel cannot be established. This may occur if, for example, the radio is out of range of the trunking site. It may be necessary to move to another location or select another trunking system to re-establish the control channel link for trunked mode operations. CC SCAN is displayed on the group line until a control channel is accessed.





SYSTEM/GROUP/CHANNEL SELECTION



System Selection



Several methods can be used to select a new system.

METHOD 1: From knob: If system selection is programmed to the SYSTEM/GROUP/CHANNEL knob, select a system by turning the SYSTEM/GROUP/CHANNEL knob to the desired system number position (1-16). The display registers the new system name on line one.

NOTE: The radio is supplied with a mechanical stop which can, if desired, limit the number of positions accessed. If the knob will not access all positions, do not force it.

METHOD 2: From keypad: If system selection is programmed as the primary function of  and , select a system by pressing , or  to scroll through the system list. The display registers the new system name on line one.

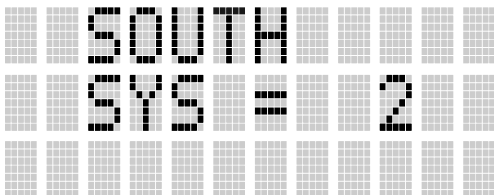
METHOD 3: Direct Access: Press  to enter the system select mode. Press the numeric key which is mapped to the desired system. Press . The radio will move to the selected system.

Note: If system selection is programmed to the SYSTEM/GROUP/CHANNEL knob, direct access to systems will not be available. Pressing  or  will scroll through different sets of 16 systems each (banks) if more than 16 systems are programmed into the radio. The systems within each bank are then selectable via the SYSTEM/GROUP/CHANNEL knob as described previously in METHOD 1.

Example:

System:	1 = North	Group:	1=Group 1
	2 = South		2=Group 2
	3 = East		3=Group 3
	4 = West		4=Group 4

Press 1 (South is the currently selected system).



SOUTH

SYS = 2

Press 4.

```
SEL SYS
      4

```

Press **(M)**.



```
WEST
GROUP1





```



Group or Channel Selection

Several methods can be used to select a new group or channel.

METHOD 1: From knob: If group selection is programmed to the SYSTEM/GROUP/ CHANNEL knob, select a group by turning the SYSTEM/GROUP/CHANNEL knob to the desired group number position. The display registers the new group name on line two. If the knob is moved to a position greater than the number of programmed groups, the highest programmed group will remain selected.

Note: If group selection is programmed to the SYSTEM/GROUP/CHANNEL knob, direct access to groups will not be available. Pressing the  or  will scroll through different sets of 16 groups each (banks) if more than 16 groups are programmed into the radio. The groups within each bank are then selectable via the SYSTEM/GROUP/CHANNEL knob as described in METHOD 1.

METHOD 2: From keypad: If group selection is programmed as the primary function of  and  select a group by pressing  or  to scroll through the group list. The display registers the new group name on line two.

METHOD 3: Direct Access: Press  to enter the group select mode. Press the numeric key which is mapped to the desired group. Press . The radio will move to the selected group.

Example:

System: 1 = North
2 = South
3 = East
4 = West

Group: 1=Group 1
2=Group 2
3=Group 3
4=Group 4

Press 2 (North is the currently selected group).

The LCD display shows two lines of text. The first line reads "GRP = 1" and the second line reads "NORTH". The text is displayed in a pixelated font on a grid background.

Press 4.

The LCD display shows two lines of text. The first line reads "SEL GRP" and the second line reads "4". The text is displayed in a pixelated font on a grid background.



Press **(M)**.

The LCD display shows two lines of text. The first line reads "NORTH" and the second line reads "GROUP4". The text is displayed in a pixelated font on a grid background.

TRUNKED MODE OPERATION

Digital trunking provides fast communication access at all times, even during busy hours. In this mode the operator selects a communications system and group and the audio communication or working channel (WC) is allocated through digital signaling with the site.

Receiving A Group Call

1. Turn on the radio by rotating the POWER ON-OFF/VOLUME knob clockwise. A short alert signal (if enabled through programming) indicates the radio is ready to use.
2. GROUP CALL - When the radio receives a group call, it unmutes on the assigned working channel and  comes on. Line one shows GR followed by the logical ID number (if received) of the unit sending the message, or the associated name if the ID number is found in the individual call list.
3. The LPE-200 stores the initiating radio ID's of the last 10 group calls received on the selected channel. To access this list press the  key twice.

6862
WHC1 = 1
[Radio Tower Icon]




The initiating radio ID of the last group call received is shown on line one of the display. Use the to view the radio ID's of other radios that initiated group calls. Pressing the key will display the time elapsed since that call was received.

00:05:00
WHC1 = 1
[Radio Tower Icon]

Pressing PTT will initiate an individual call to the displayed radio ID. Turning the radio off will clear this list.

Note: The list described above also functions to store previous individual calls received. See "**Individual Calls**" section for details.

Sending A Group Call

1. Turn on the radio and set the POWER ON-OFF/VOLUME knob to the desired volume level. Select the desired system and group.
2. Press and hold the PTT button. The radio will display  the system and group names and perform the necessary signaling required to obtain a communication channel.
3. When the working channel is assigned,  and  are displayed and a short mid-pitch tone sounds (if programmed) indicating communication can begin.

NOTE

If two or more tones, or a high pitched tone is heard, the system may be busy and the call request has been placed in queue or the request has been denied for some reason. Refer to the ALERT TONES section for more details.

4. Hold the radio approximately three inches from the mouth and speak in a normal voice into the microphone (located upper-left of speaker grille).
5. Release the PTT button when the transmission is complete and listen for a reply.

Conventional Failsoft

In the unlikely event of a failure of the EDACS or ProVoice System, communications may take place in conventional failsoft mode. The radio will be automatically directed to a communications channel set up for this purpose. During this mode of operation, **CONV FS** will be displayed in the alphanumeric display. An increase in activity on the channel during conventional failsoft operation may be noticed, so be careful not to transmit until the channel is clear.

Operation during conventional failsoft will be the same as operation on a conventional system, except that it will not be possible to select a communications channel, or use emergency and special call. When trunking is restored, the radio will automatically be returned to normal operation.

NOTE


Emergency and Special Call are not operational during conventional failsoft. Also, the **GROUP** will not operate. Conventional Failsoft must be programmed into the radio.

Emergency Operation

The radio's ability to declare an emergency, clear an emergency, remain locked on an emergency system and group, and the emergency audio and display freeze can each be enabled or disabled through programming. When an emergency is



declared scanning will stop and restarts only after the emergency has been cleared.

Receiving an Emergency Call

When receiving an emergency call on the selected group and system, an alert beep is heard and  comes on. The message ***RXEMER*** flashes in the display on line two until the emergency condition is cleared.

Declaring an Emergency Call

To send an emergency call to selected system and group (or on an optionally preprogrammed group), proceed as follows:

1. Press and hold the red EMERGENCY button that is on top of the radio in front of the antenna for approximately one second (this time is programmable and therefore could be longer or shorter; check with the system administrator). The radio will transmit an emergency call request with the radio ID until an emergency channel assignment is received.
2. When the working channel assignment is received, the radio sounds a single beep indicating the radio has auto keyed (see **Auto Key**) and is ready for voice transmission. ***TXEMER*** flashes on line two in the display until the emergency is cleared.
3. Press PTT and speak into the microphone in a normal voice.  and  momentarily turns on.







4. Release PTT when the transmission is complete.
5. To clear the emergency first press and hold the CLEAR/MONITOR button. While continuing to hold the CLEAR/MONITOR button, press the EMERGENCY button. (This will work if the radio is programmed to clear emergencies.)

SCANNING TRUNKED GROUPS

Groups which have been previously added to the scan list on a per system basis may be scanned. Each system's group scan list is retained in memory when the radio is turned off or when the battery pack is removed.

The following procedures outline scan operations for trunked groups. See the conventional mode operating procedures for specific procedures on conventional channel scanning.

Turning Scan On and Off






1. Toggle scan operation on by pressing  (SCAN Model) or  (SYSTEM Model).  icon rotates clockwise to indicate radio is scanning.
2. Toggle scan operation off by again pressing  (SCAN Model) or  (SYSTEM Model).  will disappear.
 - If the radio scans to a group other than the selected group then receives a call on the


selected group, the radio will switch to the selected group since it has priority.

- The radio will continue scanning if a new group is selected when scan is on.
- Pressing the PTT button when scan is on will cause the radio to transmit on the displayed group or to the currently selected group (depending on programming).

Adding Groups to a Scan List

SCAN Model Radios

1. Scan must be off to add/delete groups to/from the scan list. If the scan icon  is on, press the **(SCN)** key to turn scan off.
2. Select the desired group using the SYSTEM/GROUP/CHANNEL knob and/or the **(▲)** or **(▼)** keys. If the selected group is currently on the list, pressing **(A/D)** will display  on line three.
3. If the scan list status icon is blank () , the group can be added to the scan list by pressing the **(A/D)** key.  will be displayed on line three.
4. Press the **(A/D)** key a second time to set the group to Priority 2. A  is displayed on line three.

5. Press **(A/D)** a third time to set the group to Priority 1. A  is displayed on line three. The priority level section sequence only advances the group to the next high priority level and stops at priority level 1. To select a lower priority level, the group must be deleted from the scan list and then added back to the scan list. Each new group added to the scan list starts at the lowest priority. If the priority 1 and Priority 2 groups are already set and a new group is assigned as Priority 1 or Priority 2, the previously assigned group will change to non-priority scanning. One of the following messages may be momentarily displayed:




SCAN DIS The radio is not programmed to scan.

FIXED P1 A Priority 1 group has been pre-programmed into the radio. A new Priority 1 group cannot be selected.

FIXD LST A fixed scan list has been pre-programmed into the radio. It is not possible to change the list without reprogramming the radio.

Note: To quickly view multiple group scan status, press **(A/D)** then slowly but consistently rotate the group knob. Each group status will appear on the display.

SYSTEM Model Radios

1. With scan operation turned off, select the desired group to add to the selected trunked system group scan list.
2. Press **6^{ADD}_{MNO}**. The current priority status of the group will be displayed in column 10 of line three for a time-out period. If the group is not part of the scan list the status will be blank.
3. While the status is displayed, press **6^{ADD}_{MNO}** to add the group to the scan list.  is displayed on line three.
4. Press **6^{ADD}_{MNO}** a second time to set the group to Priority 2. A  is displayed on line three.
5. Press **6^{ADD}_{MNO}** a third time to set the group to Priority 1. A  is displayed on line three. The priority level selection sequence only advances the group to next higher priority level and stops at priority level 1. To select a lower priority level, the group must be deleted from the scan list and then added back to the scan list. Each new group added to the scan list starts at the lowest priority. If the Priority 1 and Priority 2 groups are already set and a new group is assigned as Priority 1 or Priority 2, the previously assigned group will change to non-priority scanning. One of the following messages may be momentarily displayed:

SCAN DIS The radio is not programmed to scan.




FIXED P1 A Priority 1 group has been pre-programmed into the radio. A new Priority 1 group cannot be selected.

FIXD LST A fixed scan list has been pre-programmed into the radio. It is not possible to change the list without reprogramming the radio.




Note: To quickly view multiple group scan status, press either **6^{ADD}_{MNO}** or the **9^{DEL}_{WXY}** key. Then slowly but consistently rotate the group knob. Each group status will appear on the display.

Deleting Groups from a Scan List

SCAN Model Radios

1. With scan operation turned off, select the desired group to delete from the selected trunked system group scan list.
2. Press **A/D**. The current status of the group is displayed for a time-out period.
3. While the current status is displayed, press **A/D** until the group from the scan list is "**blank**". The sequence is "**blank**", , , , "**blank**". Any group that is not in a trunked system group scan list will show a "**blank**" for the time-out period when it is the selected channel.

SYSTEM Model Radios

1. With scan operation turned off, select the desired group to delete from the selected trunked system's group scan list.
2. Press **9^{DEL}_{WXY}**. The current status of the group is displayed for a time-out period.
3. While the status is displayed, press **9^{DEL}_{WXY}** to delete the group from the scan list. ,  or  turns off. Any group that is not in a trunked system group scan list will show a "**blank**" for the time out period when it is the selected channel.

Nuisance Delete

A group can also be deleted from the scan list, if it is not the currently selected group, by pressing **A/D** key (SCAN Model) or **9^{DEL}_{WXY}** key (System Models) during scan operation while the radio is displaying the unwanted group. The group will be deleted from the system's group scan list in the same manner as if done using the steps above. Deletions done in this manner will not remain deleted if the radio is turned off and then back on.

SCANNING TRUNKED SYSTEMS

The radio can be programmed with the following System Scan features. These features are automatically enabled upon radio power up. A key or menu option is also defined to allow the System Scan features to be toggled during radio operation. This is covered in the MENU SELECTION and PRE-PROGRAMMED KEYPAD KEY sections. The System Scan state will be maintained through system changes but will default to ON at power up.

Wide Area System Scanning

The LPE-200 radio may be programmed for wide area system scan operation for roaming across mobile systems. Upon the loss of the currently selected system's control channel, radios may be programmed to automatically scan the control channels of other systems. If a new control channel is found, the radio will switch to the new system and sound an alert tone.

Priority System Scan

The radio may also be programmed for Priority System Scan. (In order for this feature to work properly, the control channel of the Priority System must be located on channel one, unless you are using the ProSound/ProScan algorithm). The priority system is the desired or preferred system. While receiving the control channel of the selected system, periodically the radio will leave the selected system and search for the control channel of the priority system at a programmable rate defined by the value in the Priority Scan Time control, (unless the

ProSound/ProScan algorithm is enabled as explained on the following page). This priority scan timer is reset each time the PTT button is pressed or when the call is received. If the priority system control channel is found, (or meets the predefined criteria (ProSound/ProScan)), the radio will automatically switch to the priority system.

When Wide Area System Scan Is Enabled:

If the radio cannot find the control channel of the selected system and begins to wide area system scan, the radio will only scan for the priority system control channel if the priority system is in the wide area scan list.

When ProSound/ProScan Is Enabled:

The radio monitors the priority system and will switch to the priority system if the criteria defined by the controls in the ProSound/ProScan Options dialog box are met. If ProSound/ProScan is enabled, the rate at which the radio will scan for the priority system is defined by the System Sample Time control, located in the ProSound/ProScan Options Dialog box.

ProSound





The radio may be programmed for ProSound system scan operation for multi-site applications. ProSound is an enhanced multi-site system scanning algorithm compared to Wide Area System Scan. ProSound provides the radio with the ability to select a new system for the radio to communicate on, when the selected system drops below a predefined level. This is accomplished by enabling each radio to analyze the signal quality of its current control channel and compares it with the signal quality of the control channel for each site in its' adjacency scan list. (The signal quality metric used for the ProSound algorithm is based on Digital Received Signal Strength Indicator (DRSSI) measurements). When the selected system degrades to a pre-programmed level, the radio will begin to look for a better control channel. Once a control channel that exceeds the pre-programmed parameters is found, the radio will change to the new system and emit a tone. If the control channel is completely lost, the radio will enter Wide Area System scanning and search the programmed adjacent systems until a suitable control channel is found.

ProScan

The radio may be programmed for ProScan system scan operation for multi-site applications depending on the version of radio flash code. (The ProScan algorithm is available on the LPE-200 Platform with Release R8A or higher radio flash code). ProScan is an improved multi-site system

scanning algorithm designed to replace ProSound scanning. ProScan provides the radio with the ability to select a new system for the radio to communicate on, when the selected system drops below a predefined level. This is accomplished by enabling each radio to analyze the signal quality of its current control channel and compares it with the signal quality of the control channel for each site in its' adjacency scan list. (The signal quality metric used for the ProScan algorithm is based on a combination of both Received Signal Strength Indicator (RSSI) and Control Channel Verification (CCV) measurements). When the selected system degrades to a pre-programmed level, the radio will begin to look for a better control channel. Once a control channel that exceeds the pre-programmed parameters is found, the radio will change to the new system and emit a tone. If the control channel is completely lost, the radio will enter Wide Area System scanning and search the programmed adjacent systems until a suitable control channel is found.

Menu Selection


Press  and then use the   control to scroll through the selections until **SYS SCAN** is displayed. Then press  to toggle the System Scan state. The **SYSC ON** or **SYSC OFF** display message is displayed for two seconds to show the new state.

Pre-Programmed Keypad Key

Press the pre-programmed key and the **SYSC ON** or **SYSC OFF** display message is displayed for two seconds to show the new state.

INDIVIDUAL CALLS

Receiving And Responding To An Individual Call (Trunked Mode Only)

When the radio receives an individual call (a call directed only to the user's radio), it unmutes on the assigned working channel and turns on . The first line on the display shows the logical ID number of the unit sending the message, or the associated name if the ID number is found in the individual call list. The radio can be programmed to ring when an individual call is received. If enabled, the ring begins five seconds after the caller unkeys and will continue until the PTT button, the CLEAR/MONITOR button or the individual call mode is entered.

NOTE

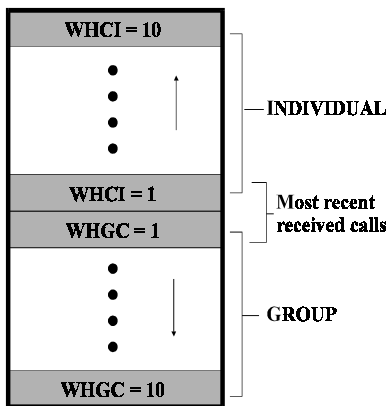
The volume of the ring is adjustable through the volume control levels.

If a response is made by pressing the PTT to the call prior to the programmed call-back time-out, the call will automatically be directed to the originating unit. If a response is not made before the call-back time-out, the radio will return to normal receive display, and ***WHC*** will appear on the first line of the LCD.

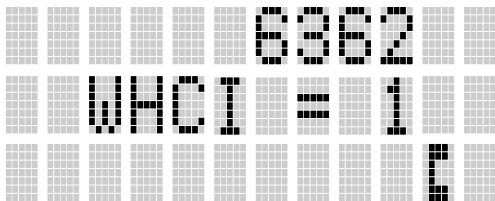
To respond after the call-back time-out, press the **#^{IND}** key. The radio's display will show the callers ID on the first line and **WHCI=1** on the second line. Pressing the PTT button at this point will initiate an individual call back to the original caller.

The radio stores the ID's of the last 10 callers in the Calls Received List as shown. Individual calls are stored in the top half of the list (1-10) and Group calls are stored in the bottom half of the list (1-10). The most recent call is stored in position 1, the second most recent call is stored in position 2 etc.

CALL RECEIVED LIST



To access this list, press the **#^{IND}** key twice. Use the **▲** **▼** keys to scroll through the list. Pressing the **(M)** key will display the time elapsed since the call was received. After pressing **#^{IND}** an example of the display is as follows









Pressing PTT will initiate an individual call to the displayed logical ID. Turning the radio off and on will clear this list.

Sending An Individual Call (Trunked Mode Only)




Pre-Stored Individual Calls






The following procedures describes how to initiate and complete a pre-stored individual call.



System Model

1. To select a pre-stored individual phone number, enter the individual call mode using the  key.  turns on. Then scroll through the list of stored numbers using the  or  key.
2. Press the PTT button; when the radio is clear to transmit,  turns on,  turns off and the channel access tone sounds. Line one shows the called individual's name if found in the list of stored individuals or **LID** followed by the logical ID number of the unit being called. The message ***INDV*** displays on line two.

Scan Model

1. To select a pre-stored individual number, enter the menu mode by using the  key. Scroll through the mode list using the  or  key.


Press .  turns on. Scroll through the list of stored phone numbers using the  or  key until the desired number is displayed. Press .



2. Press the PTT button; when the radio is clear to transmit  turns on,  turns off and the channel access tone sounds. Line one shows the called individual's name or LID. The message ***INDV*** displays on line two.

Direct Dialing of Individual Calls (System Model only)

The following procedures describes how to initiate and complete a direct dialed individual call.

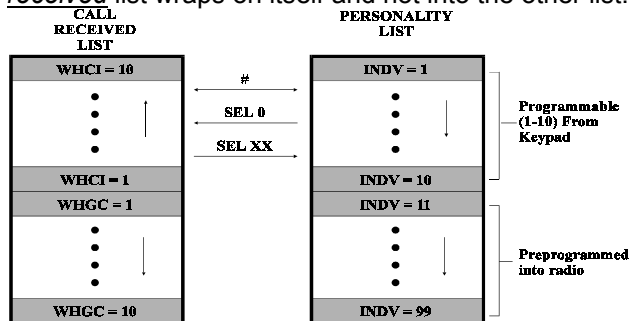
1. If the individual call ID is not stored in the pre-stored list of call ID's but the individual unit ID is known, it can be entered directly from the keypad.

Note: The ID of the last individual call made can be recalled by pressing  then the OPTION button.

- Press the PTT button to transmit.  turns on,  turns off and the channel access tone sounds. Line one shows the called individual's ID followed by the logical ID number of the unit being called. The message ***INDV*** displays on line two. Proceed talking into the microphone.

Call Storage Lists

There are two lists available for call storage in the LPE-200 radio, the *calls received* list (1 - 10) and the *personality* list (1 - 99 as defined by the user). When the individual call mode is entered by pressing (**#^{IND}**), the *calls received* list is available. The user can toggle to the personality list by selecting any index other than 0 or toggle between the two lists by pressing the (**#^{IND}**) key. If wrap is enabled, the *calls received* list wraps on itself and not into the other list.



The saved call list shows all ten storage locations. If no calls have been received, the saved call list will be empty and the pre-stored list will be available upon entering the individual call mode.

When in the saved call list, pressing the **(M)** key toggles the time stamp on and off. The time stamp indicates how long ago the call was received. When in the pre-stored list pressing the **(M)** key toggles the **Logical IDentification (LID)** on and off.

TELEPHONE INTERCONNECT CALLS

Receiving A Telephone Interconnect Call (Trunked Mode Only)

When the radio receives a telephone interconnect call (a call directed only to the user's radio), it unmutes on the assigned working channel and turns on **T**. The first line displays ***PHONE***. The second line displays ***INDV***. Proceed with the call. Press PTT to talk, release PTT to listen.




Sending A Telephone Interconnect Call (Trunked Mode Only)



Pre-Stored Number

Use the following procedures to initiate and complete a Telephone Interconnect call:

1. (System Model) To select a previously stored phone number, press **(*)^{PHN}**. **T** turns on. Use the **(▲)**, **(▼)** keys to scroll through the list of stored numbers.

(Scan Model) To select a previously stored phone number, press **(M)**. Use the **(▲)**, **(▼)** keys to select the menu option **"PHN CALL"**.

Press the  key again then use the ,  keys to scroll through the list of prestored numbers.


2. Press and release the PTT button. When the radio is clear to transmit,  turns on,  turns off and the channel access tone sounds. Line one shows the accompanying name selected from the list of stored numbers. The message ***PHONE*** displays on line two. The radio then automatically transmits the programmed number stored in the special call queue.
3. A telephone ring will be heard from the speaker. When someone answers the phone, press the PTT button and speak into the microphone. Release the PTT button to listen to the callee. Unsuccessful interconnect signaling returns the radio to the normal receive mode and the number remains displayed until the special call is cleared or the time-out expires or another group or system is selected. Terminate a call by pressing the CLEAR/MONITOR button.


NOTE



In half-duplex mode, only one person may talk at a time. The radio PTT button needs to be pressed in order to communicate to the individual called and released for the individual called to be heard.

4. To terminate the call, momentarily press the CLEAR/MONITOR button.

Direct Dialing of Phone Calls (System Model only)

1. If the phone number is not stored in the pre-stored list of phone numbers, but the phone number is known, it can be entered directly from the keypad. Start by pressing the . Then enter the required number from the keypad.

Note: The last number entered directly can be recalled by first pressing  then the OPTION button.

2. Press the PTT button: the radio performs the necessary signaling to obtain a communication channel. When the signaling is complete and the radio is clear to transmit,  turns on,  turns off and the channel access tone sounds. Line one shows the called phone number. The message ***PHONE*** displays on line two. The radio then automatically transmits the dialed number.
3. A telephone ring can be heard from the speaker. When someone answers the phone, press the PTT button and speak into the microphone. Release the PTT button to listen to the individual called. Unsuccessful interconnect signaling returns the radio to the normal receive mode and the number remains displayed until the special call is cleared or the time-out expires or another group or system is selected. Terminate a call by pressing the CLEAR/MONITOR button.

NOTE

In half-duplex mode, only one person may talk at a time. The radio PTT button needs to be pressed in order to communicate to the individual called and released for the individual called to be heard.

4. To terminate the call, momentarily press the CLEAR/MONITOR button.

DTMF Overdial / Conventional Mode Telephone Interconnect

Once the radio has established a connection to the public telephone system, it may be necessary to "over-dial" more digits to access banking services, answering machines, credit card calls or other types of systems that require DTMF (Dual-Tone Multi-Frequency) access digits.


Overdial operation can also be used to initiate a telephone interconnect call via DTMF signaling if a dial tone has already been accessed on the system. This is the method that is used for making a telephone interconnect call while operating in the conventional mode but will also function in trunked mode if a dial tone is directly accessible.

Telephone numbers and other number sequences for over dialing can be stored in the phone list when programming the radio. These numbers are accessed by pressing **(M)**, then following the selection mode rules.

The following steps are required to dial these numbers:

SCAN Radio:

1. Follow the procedure in ***Sending A Telephone Interconnect Call (Trunked Mode Only)*** to establish a connection to the telephone system or consult the system administrator for the procedure to access a dial tone on the trunked or conventional system.
2. Overdial numbers are transmitted by entering the phone mode using the **(M)** button.

Press **(M)** to enter the overdial select/entry mode and follow the selection mode rules to call up a stored number from the phone list.  turns on. Press PTT to send the overdial sequence once. If the number needs to be transmitted again it must be selected or entered again (this prevents unwanted numbers from being sent the next time the PTT button is pressed during the call).



This overdial select/entry mode remains active until the call is dropped, cleared, or **(M)** is pressed. The overdial select/entry mode can be re-entered if the call is still active by pressing **(M)**.

System Radio:

The following steps are required to dial these numbers:

1. Follow the procedure in ***Sending A Telephone Interconnect Call (Trunked Mode Only)*** to establish a connection to the telephone system or consult the system administrator for the procedure to access a dial tone on the trunked or conventional system.
2. Overdial numbers are transmitted using either method as follows:

METHOD 1: Press and hold PTT while entering the overdial number sequence from the keypad. This method sends DTMF tones during individual, telephone interconnect., trunked group or conventional channel calls. Anytime the PTT button is pressed and held, the keypad is enabled for DTMF entry.

METHOD 2: Press  PHN to enter the overdial select/entry mode and follow the selection mode rules to call up a stored number from the phone list or to direct enter the overdial digits.  turns on. Press PTT to send the overdial sequence once. If the number needs to be transmitted again it must be selected or entered again (this

prevents unwanted numbers from being sent the next time the PTT button is pressed during the call).


This overdial select/entry mode remains active until the call is dropped, cleared, or **(M)** is pressed. The overdial select/entry mode can be re-entered if the call is still active by pressing **(*PHN)**.




PROGRAMMABLE ENTRIES

Prestoring Individual and Telephone Interconnect Calls from the Keypad (System Model only)

Individual Call ID numbers, telephone numbers and other number sequences for over dialing are stored in the special calls lists when programming the radio. The radio operator can change the first ten entry locations of these lists. The keypad is used when adding, changing and storing numbers in these entry locations.

Use the following procedure to store a number in one of the first ten entries of a special call list:





1. Press **(#^{IND})** or **(*^{PHN})** to enter the individual call list or the phone call list.  turns on.
2. Scroll through the list using the **(▲)** or **(▼)** until one of the first ten entries is reached. **NO ENTRY** is displayed if the location is empty.


3. Enter the desired number. If necessary, a pause can be entered by pressing and holding 0-9, , or  until an underscore appears in the display (telephone interconnect only). The individual call list entries will accept up to 5 digits. The phone call list entries accept a combination of up to 31 digits and pauses.
4. Press and hold  until the display changes indicating that the number has been stored.
5. Repeat the steps above if the number stored in an entry location needs to be changed.

STATUS/MESSAGE OPERATION




Status operation permits the transmission of a pre-programmed status condition to the EDACS site. Message operation permits the transmission of a pre-programmed message text to an EDACS site.

STATUS OPERATION

To send a status condition, press the  key followed by  or  key to select the pre-programmed status. STATUS and 0 through 9 pre-programmed status selections are available from the menu. If STATUS is selected you need to enter the number of the status message you intend to transmit. If no status has been programmed for the selected number key, the radio will display "**NO ENTRY**". A valid selection will permit the status text to appear in the display for a pre-programmed time. After the time-out expires or the  key has been

pressed (the  key will override the time-out period), the status is selected and will be transmitted to the site or stored in the radio memory where it can be polled by the site at a future time. Status messages can also be programmed for single key operation so that a single press of a key assigned to a status message automatically transmits that message. If the site does not receive the status properly, the radio will sound a low pitched tone.

The status selection can also be canceled by pressing the CLEAR button prior to the time-out period.

To view the currently selected status after it has been transmitted, press the  key and then the  key to ramp to STS, re-press the  key again and then the CLEAR button prior to the time-out period. If the status was not sent successfully to the site, the text associated with the status will flash in the display.

MESSAGE OPERATION

Message operation is performed in the same manner as status operation in previous paragraph.

DYNAMIC REGROUP OPERATION

Dynamic group operation permits multiple talk groups (up to eight) to be added to a radio via the system manager. The radio must be pre-programmed to respond to regrouping. Dynamic regrouping will not be activated in a radio until an

activation message is sent by the system manager. Each radio that receives and acknowledges the regrouping instructions is successfully regrouped.

Pressing and holding the CLEAR/MONITOR button for 2.5 seconds toggles the user into and out of the dynamic regroup groupset. A double beep will sound for entry or exit. The display will indicate **"REGRP_0x"** where "x" is a digit of 1 to 8 indicating the group when dynamic regroup has been enabled by the user. If the radio is in dynamic regroup and the user selects a group that has not been regrouped, the display will show **"NO ENTRY"**. The radio will be prevented from transmitting and receiving calls in this condition except for scanned groups.

NOTE

The mode of communication on a selected talkgroup is determined by programming. If the selected programmed talkgroup is programmed for digital communication, the regrouped talkgroup will be in digital mode; if programmed for analog communication, the regrouped talkgroup will be in analog mode.

EMERGENCY OPERATION

If the pre-programmed groupset on the currently selected system contains an EMER/HOME group and the radio is in dynamic regroup, the radio will

declare the emergency on the currently selected dynamic group.

MACRO KEY OPERATION

Macro key operation permits the user to accomplish a series of key strokes with a single "macro" key stroke. Each Macro Key is capable of executing up to twenty (20) key strokes, to any pushbutton input (i.e., keypad keys, OPTION button, etc.). Each macro key can be pre-programmed to activate when pressed or when released.

A macro key may also be pre-programmed to change the key stroke sequence the next time the macro key is activated.

For detail operation and assignment of macro keys, contact your communications supervisor or administrator.









MENU

The menu function accesses features that are not available directly from the keypad. The order and actual menu items available is configurable through programming. Upon radio power up, the menu item that is at the top of the menu list will always be displayed first. Subsequent access to the menu function will return the last menu item that was shown in the display and cursor position. To enter the menu mode, press **(M)**.


Upon entering the menu selection mode, Menu options will appear on the display, i.e.

>BCK LIGHT
REVISION
CONTRAST

The radio will continue to receive and transmit normally while in the menu function.

To scroll through the menu options use the , or  keys. When the required menu item has been found align the cursor with the option then press  to select it. The menu item's parameter setting shown in the display can now be changed by using , or  to scroll through the list of parameter values. Once the desired setting is reached press  to store the value and return the menu option selection level. For menu items that display radio information, pressing , or  will scroll through a list of informational displays. The possible menu items are listed in Table 1.

An example of the menu item selection process and menu item parameter change is detailed below for the backlight menu item.

PRESS: 

The menu mode is entered.

PRESS:  or  until the display shows:

```

>BCK   LGHT
REVISION
CONTRAST

```

PRESS:

The backlight menu item is activated.

Line one shows the active menu item and its current parameter setting. Line two shows the currently selected system or group name.

```

BCKL=ON
FIRE

```

The menu item's parameter setting shown in the display can now be changed by using , or . Once the desired setting is reached press to store the value and return the menu option selection level.

For menu items that display radio information pressing , or will scroll through a list of informational displays. The menu items are listed Table 2.

NOTE




The TX POWER menu item, when selected, toggles LO/HI/AUTO power for trunked systems or LO/HI power for conventional systems. It does not use  or  to scroll nor an additional press of the  button.

Table 2 - Menu Item Information

FEATURE	DISPLAY	PARAMETER SETTING	COMMENT
Keypad Lock	Menu item: KEY LOCK Once selected: LOCKED	Locked Unlocked	Locks the keypad. To unlock; press and release "M" then within 1 second press the option button. (NOTE: this sequence is also a short cut to locking the keypad.)
Backlight Adjust	Menu item: BCK LIGHT Once selected: BCKL=	OFF-ON	Selects the light level for backlighting.
Contrast Adjust	Menu item: CONTRAST Once selected: CNTRST=	1, 2, 3, 4	Selects the display contrast level.
Transmit Power Select	Menu item: TX POWER Once selected: POWER=	HI, LO AUTO-TRNK	Selects: radio output power mode
Radio Revision Information	Menu item: REVISION	Informational displays only (see radio); no user selectable settings.	Selects the <u>information</u> display to view.*
Toggle Scan On/Off	SCAN	ON/OFF	Toggles Scan operation On/Off.
Toggle Private Mode	PRIVATE	ON/OFF	Toggles private mode ON/Off.
Display current Encryption Key	DISP KEY	Informational displays only (see radio); no user selectable settings	Displaces current encryption key.

FEATURE	DISPLAY	PARAMETER SETTING	COMMENT
Display Current Home Group/ Channel	HOME	N/A	Selects Home Group/Channel
Select Desired System	SYS SEL	N/A	Refer to the Table of Contents for SYSTEM/ GROUP/ CHANNEL SELECTION.
Add Group/ Channel to Scan List	SCAN ADD	N/A	Adds to Scan List.
Delete Group/Channel From Scan List	SCAN DEL	N/A	Deletes from Scan List.
Add/Delete Scan List	SCAN A/D	N/A	Add, deletes from Scan List.
Select Telephone Numbers From Phone List	PHN CALL	N/A	Trunked Only. Refer to the Table of Contents for TELEPHONE INTERCONNECT CALLS.
Data Operation	NO DATA	ON/OFF	Trunked Only. Toggles Data operation On/Off
Select Individual Call from IC List	IND CALL	N/A	Trunked Only. Refer to the Table of Contents for TELEPHONE INTERCONNECT CALLS.
Select Group	GRP SEL	N/A	Trunked Only. Refer to the Table of Contents for SYSTEM/GROUP/ CHANNEL SELECTION.
Talkaround	TALKARND	ON/OFF	Conventional Only. Toggles talkaround feature On/Off
Select Channel	CHN SEL	N/A	Conventional Only. Table of Contents for SYSTEM/GROUP/ CHANNEL SELECTION
ProFeatures	Menu item: PROFEAT SERIAL_ROM_ # FEATDATA_2 TRKSYS#	Informational displays only (see radio); no user selectable settings	Indicates current features programmed into the radio as well as certain information required to add features to the radio (refer to Table of Contents for ProFeatures).

FEATURE	DISPLAY	PARAMETER SETTING	COMMENT
Feature Encryption Display	Menu Item: FEATURES Once selected: See Feature Encryption Display section	Informational displays only; no user selectable settings	Indicates current features programmed into the radio as well as certain information required to add features to the radio (refer to the Table of Contents for Feature Encryption Display.).
System Scan Enable	Menu Item: SYS SCAN Once selected: SYSC ON or SYSC OFF	ON, OFF	System Scan features are toggled on and off.

*Information Display

PRS - NAME XXXXXXXX	Personality Name
COM-NET ERICSSON (C) - 1995	Copyright
FLSH - VER	FLASH Software r - released, 01A - revision state
DSP__RAM	DSP Software

DIGITAL VOICE OPERATION

Digital voice programmed systems have three (3) different voice modes: clear (analog), digital and private (encrypted). The voice modes are programmed on a per-group basis within each trunked system and on a per-channel basis within each conventional system.

Clear Mode

The clear mode is a voice mode in which the radio transmits and receives only clear (analog) voice signals. These analog signals are non-digitized and

non-encrypted. Clear mode transmissions can be easily monitored by unauthorized persons. Groups or channels programmed for clear operation cannot transmit or receive digital or private messages.

Digital Mode

The digital mode allows the radio to transmit and receive digitized voice signals. Digital signals provide improved weak signal performance and cannot be easily monitored with a standard receiver. Groups and channels programmed for digital operation transmit only digital signals. Message trunked group calls and individual calls are answered back in the mode which they were received assuming the call or hang time is still active. Individual phone, all call, and emergency calls are transmitted clear if the digital mode is disabled or inoperative.

1. If receiving an analog message trunked call, the radio responds in the analog mode during the hang time on the working channel.
2. If receiving an analog I-Call, the radio responds in the analog mode during the hang time.
3. When using the ***WHC*** feature to respond to an I-Call (after the hang time has expired), the call is transmitted in the mode defined by the system mode as programmed for the current system if the ID being called is not in the I-Call list. If the ID is in the I-Call list, then the call is transmitted as defined by the I-Call mode programmed in the list for that ID.


DTMF

The overdial DTMF tones are not available while in the Digital Mode.

Private Mode

The private modes allow the radio to transmit encrypted messages and receive clear or private transmissions. The radio transmits private if the group/channel is programmed for private operation and forced operation is pre-programmed. If autoselect operation is pre-programmed and the radio is in the private mode, the radio transmits in the mode of the received call if the hang time is active. If no hang time is active, the radio transmits private.

Cryptographic keys are transferred to the radio using a cryptographic Keyloader. Up to seven (7) different cryptographic keys, numbered 1-7, can be transferred from a Keyloader and stored in the radio. An individual key is automatically selected on a per-group/channel basis according to the radio programming. Groups and channels within the digital system can be programmed for keys 1-7 (private). Up to 8 banks of 7 keys can be stored for private systems. The bank is specified per system.

When operating on a group or channel programmed for private mode, all transmissions are private transmissions and the radio receives clear and private signals. The  status icon display turns on when the private mode is enabled. If the selected group or channel is programmed for autoselect capability, the mode may be toggled between private

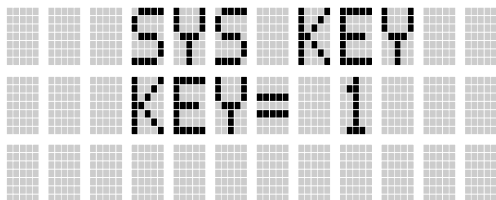
and clear with the (M) key, then following the selection mode rules. Radios programmed for forced private operation do not allow a change of the transmit mode.

Displaying the Currently Used Cryptographic Key Number

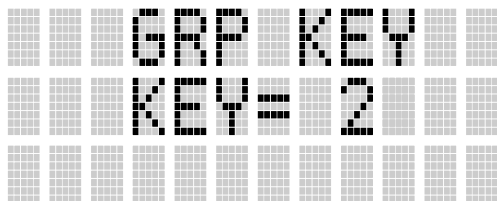
To display the cryptographic key currently in use for either the system encryption key (for special call such as individual, phone, all, agency or fleet) or the group/channel key (for group or conventional calls), perform the following procedure:

1. Press the (M) button .
2. Use the (▲) or (▼) button to select "**DISP KEY.**"
3. Then use the (▲) or (▼) button to toggle between displaying the system key or the group/channel key.

System Encryption Key



Group/Channel Encryption Key




Key Zero

All cryptographic keys can be zeroed (erased from radio memory) by pressing the MONITOR/CLEAR button and while still pressing this button, press and hold the OPTION button. Press both buttons for 2 seconds. A series of beeps will begin at the start of the 2 second period and then switch to a solid tone after the keys have been zeroed. The display will indicate "**KEY ZERO.**"

If the cryptographic key(s) are zeroed, one or more keys must be transferred from the Keyloader into the radio before private communications may continue.




Private Operation

Receiving an Encrypted Call

When receiving, the radio automatically switches between clear or private operation. If the transmission being received is an encrypted transmission, it will be decrypted, the  icon will turn on, the receiver will unsquelch and the message will be heard in the speaker. For this to occur, the selected group or channel must be programmed for

private operation and the correct cryptographic key must be loaded into the radio.

Transmitting an Encrypted Call

1. Select the desired group or channel.
2. Place the radio in private mode by pressing the  key, then follow the selection mode rules. On a System radio, the  key can be used to toggle the private mode on/off. When private mode is enabled, the  icon will be on.

If the last state of the radio was private mode, the private mode will be enabled on power up. Also the private mode will be enabled if forced operation has been programmed in the radio.

If a group or channel is not programmed for private mode operation, **"PVT DIS"** will be displayed if attempt is made to enable private transmit mode. It is not possible to operate on this group/channel in private mode.

If the radio does not have the correct encryption key loaded, **"NO KEY#"** will be displayed and the call will not be transmitted.

3. Continue with standard transmission procedures. A private mode access tone will be heard when the PTT button is pressed.

Scanned Group Calls

Receiving a scanned group call is the same as receiving a selected group call. During the scan hang time, if the radio was programmed for autoselect, it will transmit back in the same mode it received the call. For example, if a clear group is entered in the scan list, it will only receive clear calls. If the same group was available in private and entered in the scan list, it can receive clear and private calls, provided autoselect was programmed in the radio. The user can select transmitting on the scanned or selected group. If a group is entered in the scan list more than once and in different modes (clear, digital, private), only the first occurrence of the group will be used.

**Table 3 - Transmit/Receive Mode Compatibility
For Digital Voice Operation**

GROUP/CHANNEL PROGRAMMING (TRANSMIT)	CLEAR RECEIVE	DIGITAL RECEIVE	PRIVATE RECEIVE
CLEAR	Yes	No	No
DIGITAL	Yes	Yes	No
PRIVATE	Yes	No	Yes*

*assumes the proper cryptographic key is loaded

NOTE

Conventional Digital or encrypted channels require Channel Guard on the channel to operate correctly.

NOTE

The voice coding technology embodied in this product is protected by intellectual property rights including patent rights, copyrights, and trade secrets of Digital Voice Systems, Inc. The user of this technology is explicitly prohibited from attempting to decompile, reverse engineer, or disassemble the Object Code, or in any other way convert the Object Code into a human-readable form

PORTABLE DATA

The LPE-200 radios, when operating in the EDACS configuration, permit either voice or data calls to be transmitted or received. The radio can handle only one type of call at a time; however, selection of either data or voice is selected transparently by the operator through normal usage of the radio. Data communications is not supported in the conventional mode.

The radios can be connected to Mobile Data Terminals (MDT) or to a host computer. Any RS-232 compatible device that supports the Radio Data Interface (RDI) protocol (Version 1.91 or greater) may be connected to the radio. Support for MDT's or host computers is a programmable option per radio. Additionally, radios may also be programmed for data only operation (no voice calls transmitted or received).

DISPLAYS

The following will be displayed in the display during the various states of data mode of operation.

TX DATA Displayed on top line of display when the radio is transmitting a data call.

RX DATA Displayed on top line of display when the radio is receiving a data call.

DATA OFF Displayed on top line of display when the radio is in the data disabled state.

DATA ON Displayed for two seconds on top line of display when the radio is toggled to the data enabled state.

DATA OFF OPERATION

The radio can be placed in the data disabled state by any of the following methods. When the data state is disabled, the display shows "**DATA OFF**" on the top line.

- Declaring an emergency (not to be used unless an actual emergency condition exists). Alert tone will sound.
- Pressing the OPTION button (if pre-programmed for no data key). Alert tone will sound.
- Pressing the no data (ND) key (pre-programmed).

DATA ON OPERATION

The data state is enabled by one of the following (depending on how it was disabled). "**DATA ON**" will be displayed on the top line in the display for two seconds then the display returns to normal.

- Pressing the no data (ND) key toggles data state on or off.
- Clearing an emergency but valid only if emergency caused data off operation.

EXITING DATA CALLS

Under normal conditions, the radio enters the scan lockout mode and returns to the control channel after completion of a data call (transmit or receive). If, during a data call, one of the following conditions occurs, the data call is immediately terminated and the radio performs the desired function:

- PTT activated.
- Emergency declared by pressing the pre-programmed emergency button.
- A group or system change.

SCAN LOCKOUT MODE

Following the transmission or reception of a data call, if scan is enabled, scanning will stop temporarily [two independent pre-programmed times (after receive data call and after transmit data call)]. During this time the scan indicator will flash to indicate that scan is enabled but temporarily suspended. This mode is normally exited when the pre-programmed time expires; however, the following actions will terminate the scan lockout mode before the timeout is completed.

- The CLEAR button is pressed.
- The PTT is pressed.
- A group or system change.
- Entering phone call mode.

- Entering individual call mode.
- A new emergency assignment has been received.
- An emergency declared or cleared.
- Receiving an individual or phone call.
- Receiving Agency, Fleet or System All Call.
- Pressing **(SCN)** or **(3^{SCN}_{DEF})** to turn scan on or off.


DATA LOCKOUT MODE

During the voice call scan hang time (pre-programmed) the radio will not receive data calls.


CONVENTIONAL OPERATION

The radio functions in the conventional mode when using conventional communications channels (non-trunked). Each channel consists of a preset frequency pair for transmit and receive during repeater operation, or a single frequency for both transmit and receive during talk-around (no repeater) operation. To use this mode, the operator selects a conventional system which includes one or more conventional channels. Each conventional channel may have one or more features, such as Channel Guard, programmed when the channel is selected.

The CLEAR/MONITOR button unmutes the receiver so activity on the selected channel can be monitored. When pressed and held for approximately 3 seconds this button toggles conventional channel decoding (Channel Guard,


Digital Channel Guard) on and off if programmed for the selected channel.  will be on when channel guard is enabled on a selected channel.


RECEIVING A CALL

1. Turn on the radio by rotating the POWER ON-OFF/VOLUME knob clockwise (out of detent). A short alert signal (if enabled through programming) indicates the radio is ready to use.
2. Adjust the POWER ON-OFF/VOLUME knob to the desired volume level.
3. Select the desired conventional system and channel. The display indicates the current conventional system and channel names.
4. The radio is now ready to receive calls.
5. When the radio receives a call (and the correct encoding is decoded, if programmed and enabled), it unmutes on the channel and  comes on.

SENDING A CALL






1. Turn on the radio and set the POWER ON-OFF/VOLUME knob to the desired volume level. Select the desired conventional system and channel.
2. Ensure that the channel is not busy by pressing the CLEAR/MONITOR button to momentarily disable any channel decoding and unmute the

receiver or observe the display for the absence of . If the Channel Busy Lockout feature is programmed for the selected channel, the radio will not transmit when the channel is busy.

3. Press and hold the PTT button. The radio will display  and a short beep sounds (if programmed) indicating that communication can begin.
4. Hold the radio approximately three inches from the mouth and speak in a normal voice into the microphone (located at upper left front corner).
5. Release the PTT button when the transmission is complete and listen for a reply.


The following procedures outline scan operations for conventional channels.

ADDING CHANNELS TO A SCAN LIST

1. With scan operation turned off select the desired channel to add to the selected conventional system channel scan list.
2. Press  (Scan) or  (System). The current status will be displayed in column 10 of line three for a time-out period. Press  or  to add the channel to the scan list.  is displayed on the line. This sets the selected channel for non-priority scanning. One of the following messages may be momentarily displayed:

- SCAN DIS** The radio is not programmed to scan.
- FIXD LST** A fixed scan list has been pre-programmed into the radio. It is not possible to change the list without reprogramming the radio.



DELETING CHANNELS FROM A SCAN LIST

1. With scan operation turned off select the desired channel to delete from the selected conventional system's channel scan list.
2. Press **(A/D)** (Scan) or **(9^{DEL} WXY)** (System). The current status is displayed for a time-out period.
3. Press **(A/D)** or **(9^{DEL} WXY)** during this time-out period to delete the channel from the scan list.  turns off. Any channel that is not in a conventional system channel scan list will show a "blank" for the time-out period when it is the selected channel.

Nuisance Delete

A channel can also be deleted from the scan list, if it is not the currently selected channel, by pressing **(A/D)** (scan) key during scan operation while the radio is displaying the unwanted channel. The channel will be deleted from the system's channel scan list in the same manner as if done using the steps above. Deletions done in this manner will not remain deleted if the radio is turned off and then back on.

TURNING SCAN ON

1. Toggle scan operation on by pressing **(SCN)** or **(3^{SCN}_{DEF})**.  rotates clockwise when the radio is scanning.
2. When a channel on the scan list receives a channel assignment, the radio unmutes on the assigned channel,  comes on and the received scan channel is displayed.
 - The radio will continue scanning if a new channel is selected when scan is on.
 - Pressing the PTT button when scan is on will cause the radio to transmit on the displayed channel or to the currently selected channel (depending on programming).

NOTE

Scan will be temporarily disabled when an emergency is declared.

TURNING SCAN OFF

Toggle scan operation off by pressing **(SCN)** or **(3^{SCN}_{DEF})**. The radio will resume operation on the selected channel.

OPERATING RULES AND REGULATIONS

NOTE

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

Two-way FM radio systems must be operated in accordance with the rules and regulations of the Federal Communications Commission (FCC). As an operator of two way radio equipment, the user must be thoroughly familiar with the rules that apply to the intended type of radio operation. Following these rules will help to eliminate confusion, assure the most efficient use of existing radio channels, and result in a smoothly functioning radio network.

When using the radio, remember these rules:

1. It is a violation of FCC rules to interrupt any distress or emergency message. In conventional mode the radio operates in much the same way as a telephone "party line" therefore always listen to make sure that the line is clear--that no one else is on the air--before sending any messages. If someone is sending an emergency message--such as reporting a fire or asking for help in an accident--KEEP OFF THE AIR!

2. Use of profane or obscene language is prohibited by Federal Law.
3. It is against the law to send false call letters or a false distress or emergency message.
4. The FCC requires that conversations be brief and confined to business. To save time, use coded messages whenever possible.
5. Using the radio to send personal messages (except in an emergency) is a violation of FCC rules. Only those messages essential for the business operation may be sent.
6. It is against the Federal law to repeat or otherwise make known anything overheard on the radio. Conversations between others sharing a communications channel must be regarded as confidential.
7. The FCC also requires that the caller be identified at certain specific times by means of call letters. Refer to the rules that apply to the particular type of operation for the proper procedure.
8. No changes or adjustment shall be made to the equipment except by an authorized or certified electronic technician.

OPERATING TIPS


The following conditions tend to reduce the effective range of two-way radios and should be avoided whenever possible.

- Operating the radio in low areas of terrain or while under power lines or bridges.
- Operating the radio inside of a vehicle or in a metal or steel framed building unless using an outside antenna.
- Obstructions such as mountains or buildings between the sending and receiving parties.

In areas where transmission or reception is poor, some improvements may be obtained by insuring that the antenna is vertical. Moving a few yards in another direction or moving to a higher elevation may also improve communication.

BATTERY PACKS

CHARGING THE BATTERY PACK

After receiving a new rechargeable battery pack, it should be fully charged before placing it into service. This also applies to rechargeable batteries that have been stored for long periods. When the battery pack requires charging, the radio will signal the operator with an alert tone and the radio will display  in its LCD.

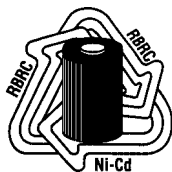
Chargers are available with nominal charge times of one hour. Combinations include single and multiposition, rapid charge units. When charging a battery pack that is attached to a radio, always turn the radio off to ensure a full charge. For specific instructions refer to the applicable charger Operating Manual. Charging in non-M/A-COM equipment may lead to battery damage and void the battery warranty.

Batteries which have been stored (charged or discharged) will generally not be capable of full capacity until the batteries have been fully cycled two or three times. Charging a battery in a M/A-COM rapid charger and discharging the battery pack with the radio until low battery is indicated is considered one cycle.

Improvements in the manufacturing of present generation NiCD rechargeable batteries minimize the probability of M/A-COM batteries developing memory. It is recommended that on a regular basis the battery be charged on a M/A-COM rapid charger and discharged on the radio until the low battery is indicated.

RECHARGEABLE BATTERY PACK DISPOSAL

NICKEL CADMIUM (NiCd) BATTERY PACK DISPOSAL



The product you have purchased may contain a NiCd (Nickel Cadmium) rechargeable, recyclable battery. At the end of its useful life under various state and local laws it may be illegal to dispose of this battery into the

municipal waste stream. Check with your local solid waste officials for details concerning recycling options or proper disposal in your area. Call Toll Free **1-800-8-BATTERY** for information and/or procedures for returning rechargeable batteries in your state.

NICKEL METAL HYDRIDE (NiMH) BATTERY PACK DISPOSAL

There are no laws regulating the disposal of nickel metal hydride rechargeable batteries. However, they may be recycled. Call Toll Free 1-800-8-BATTERY for information and/or procedures regarding the recycling of nickel metal hydride rechargeable batteries.

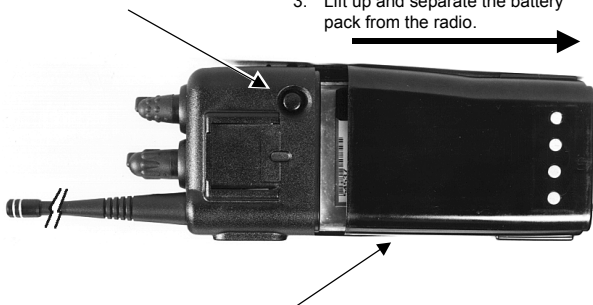
INSTALLING THE BATTERY PACK

1. Ensure the POWER ON-OFF/VOLUME knob is in the OFF (detent) position.

2. Align the battery pack tabs with the battery mounting plate slots on the back of the radio (see Figure 7).
3. Insert the tabs into the slots, push down and slide the battery toward the battery latch until the battery latch clicks into place.

1. While pressing the Battery Pack Release Button

2. Take hold of the Battery Pack and slide it back until it stops.
3. Lift up and separate the battery pack from the radio.



4. When replacing the battery pack, align the ribs on the sides of the battery pack with the slots in the sides of the radio. Push down and slide the battery pack into place.

Figure 7 - Installing and Removing the Battery Pack

REMOVING THE BATTERY PACK

1. Ensure the POWER ON-OFF/VOLUME knob is in the OFF (detent) position.

2. Press the battery release button to release the battery.
3. Remove the battery pack by sliding it back until it stops. Then lift up and away until it separate from the radio.

INTRINSICALLY SAFE USAGE

Selected portable radios with appropriate factory installed options are certified as Intrinsically Safe by the Factory Mutual Research Corporation and the Canadian Standards Association. Intrinsically Safe approval through Factory Mutual includes Class I, II, III, Division 1 hazardous locations in the presence of Groups D, F and G atmospheres. Non-Incendive approval includes Class I, Division 2 hazardous locations in the presence of Groups A, B, C and D atmospheres. Approval through the Canadian Standards Association (CSA) includes Class I Group D, Class II Group G Coal Dust, and Class III. CSA approval also includes Class I, Division 2 Groups A, B, C and D.

Hazardous locations are defined in the National Electrical Code. Useful standards NFPA 437A and NFPA 437M for the classifications of hazardous areas can be ordered from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

BATTERY PACKS

Only battery packs identified with a green FM/CSA label shall be used with a portable radio that is rated and labeled as Factory Mutual/CSA Intrinsically Safe. Use of nonspecified battery packs voids Factory Mutual/CSA approval. The following battery packs are approved for use in intrinsically safe radios:

BKB 191 202/2 Rechargeable Battery Pack,
Extra High Capacity

BKB 191 203/2 Rechargeable Battery Pack,
High Capacity

ACCESSORIES

Use of accessories other than those listed voids Factory Mutual/CSA approval. The following accessories are for use with intrinsically safe radios:

KRY 101 1617/3	Speaker Microphone
KRY 101 1617/A2, A4	Speaker Microphone with Antenna ProVision (order antenna separately)
RLD 541 07/11	Earpiece Kit
KRE 101 1223/01 Whip	Antenna, 806-870 MHz,
KRE 101 1216/01	Antenna, 806-870 MHz, Elevated Feed
KRY 101 1232/2	Belt Clip
KRY 101 1608/A1	Belt Loop w/swivel
KRY 101 1605/01	Leather Case w/Belt Loop
KRY 101 1605/02	Leather Case w/swivel & Belt Loop
KRY 101 1607/1	Shoulder Strap

GLOSSARY

agency	- an agency is composed of multiple fleets. Units can be programmed to initiate agency calls to access multiple fleets. (Trunked Mode Only)
Base/Unit Operation	- a programmed option used in some fleets so units can only hear and talk to a base dispatch unit, not to other mobiles or personals in the group. In this mode of operation, when a unit in a particular group is talking to the base dispatch unit, all other mobile and personal radios in that group will receive a "System Busy" tone if they try to access the system. (Trunked Mode Only)
control channel	- a radio channel in a trunked system that is used to digitally communicate with the radios operating on the system when they are not engaged in active voice communications.
conventional channel	- a radio channel (transmit/receive) that is allocated for conventional (non-trunked) use and may be manually selected by the operator.
conventional mode	- communicating on radio channels allocated for conventional use.
CCT	- Carrier Controlled Timer - a programmable timer that will disable a transmission if the timer length is exceeded.
CG	- Channel Guard - a method of controlling receiver mute with a tone or digital code.
Dynamic Regrouping	- Dynamic Regrouping is a feature which allows the System Manager to dynamically program new groups into selected radios. The System Manager develops the regrouping plan and directs the site controller to send each radio the regroup information.
fleet	- a fleet of users consists of multiple groups (subfleets). Radios can be programmed to make fleet calls to simultaneously access multiple user groups. (Trunked Mode Only)

- group subfleet or- a group of users share the same program group identification number in their mobile and personal radios. All units in the same group will receive a dispatch call placed by any one unit in the group. (Trunked Mode only).
- group scan - programming that allows the radio to monitor up to 64 separate groups simultaneously (multi-group decode), permitting the user to both monitor and receive calls from these groups. When a radio receives a call from one of these groups, it will "lock out", and not send or receive calls from other groups for a programmed period of 5, 10 or 15 seconds, permitting the user to respond to the group call. (The radio may also be programmed for no lock out period.) At the end of the "lock out" period, the radio sounds two short low pitched "beeps" and is again ready to receive a call from any of the programmed groups. (Trunked Mode Only)
- Individual Call - Every radio in the system is programmed with a unique individual identification code. A mobile or personal unit can be programmed to call another particular unit by selecting the individual by name or ID number. (Trunked Mode Only)
- queueing - the process that occurs when all channels in a trunked system are busy and calls must be addressed on a priority basis.
- site controller - the computer controlled radio equipment at the repeater site that controls a trunking system.
- system (area) - the terms "system" and "area" are used interchangeably to refer to the particular group of station repeaters currently providing service to the radio.
- System Manager - a computer that preforms the data basing and system monitoring for the site controller.

- System Scan - a programmed feature to scan (monitor activity on) separate trunked systems and receive calls on any of these systems. (Trunked Mode Only)
- Talk-around mode - also referred to as "direct mode", talk-around provides a direct unit-to-unit short range communications link. It is intended to maintain communications outside of the main system coverage area.
- Telephone Interconnect - this feature allows the user to initiate or receive telephone calls through the radio if the system is configured for this operation. (Trunked Mode Only)
- trunked group - a radio communications path shared by two or more users.
- Trunked Operation - Trunked Operation refers to the use of a set of radio frequency channels by multiple user groups. By using high speed digital data the radio goes to an unused channel when a call is initiated and will also only respond to calls in the same user group. In this way conversation privacy between user groups is assured.
- trunked radio system - a radio system in which a limited number of radio channels is dynamically allocated to groups of people for communication purposes.
- trunked system - a set of one or more trunked groups.
- Wide Area Encode - a programmed option which ensures all system scanning mobile and personal radios have time to lock onto the call before the initiating unit is allowed to talk.
- working channel - a radio channel (transmit/receive) that is automatically assigned by the site controller for voice or data communications.

WARRANTY

- A. M/A-COM Private Radio Systems, Inc. (hereinafter "Seller") warrants to the original purchaser for use (hereinafter "Buyer") that Equipment manufactured by or for the Seller shall be free from defects in material, workmanship and title, and shall conform to its published specifications. With respect to any Equipment not manufactured by or for the Seller (except for integral parts of Seller's Equipment to which the warranties set forth above shall apply), Seller gives no warranty, and only the warranty, if any, given by the manufacturer shall apply. Batteries are excluded from this warranty but are warranted under a separate Battery Warranty.
- B. Seller's obligations set forth in Paragraph C below shall apply only to failures to meet the above warranties (except as to title) occurring within the following periods of time from date of sale to the Buyer and are conditioned on Buyer's giving written notice to Seller within thirty (30) days of such occurrence:
1. for fuses and non-rechargeable batteries, operable on arrival only.
 2. for parts and accessories (except as noted in B.1) sold by Seller's Service Parts Operation, ninety (90) days.
 3. for PANTHER™ Series handportable and mobile radios, two (2) years.
 4. for Cougar™ Series handportable and mobile radios, two (2) years.
 5. for all other Equipment of Seller's manufacture, one (1) year.
- C. If any Equipment fails to meet the foregoing warranties, Seller shall correct the failure at its option (i) by repairing any defective or damaged part or parts thereof, (ii) by making available at Seller's factory any necessary repaired or replacement parts, or (iii) by replacing the failed Equipment with equivalent new or refurbished Equipment. Any repaired or replacement part furnished hereunder shall be warranted for the remainder of the warranty period of the Equipment in which it is installed. Where such failure cannot be corrected by Seller's reasonable efforts, the parties will negotiate an equitable adjustment in price. Labor to perform warranty service will be provided at no charge during the warranty period only for the Equipment covered under Paragraph B.3. To be eligible for no-charge labor, service must be performed by an Authorized Service Center (ASC) or other Servicer approved for these purposes either at its place of business during normal business hours, for mobile or personal equipment, or at the Buyer's location, for fixed location equipment. Service on fixed location equipment more than thirty (30) miles from the Service Center or other approved Servicer's place of business will include a charge for transportation.
- D. Seller's obligations under Paragraph C shall not apply to any Equipment, or part thereof, which (i) has been modified or otherwise altered other than pursuant to Seller's written instructions or written approval or, (ii) is normally consumed in operation or, (iii) has a normal life inherently shorter than the warranty periods specified in Paragraph B, or (iv) is not properly stored, installed, used, maintained or repaired, or, (v) has been subjected to any other kind of misuse or detrimental exposure, or has been involved in an accident.
- E. The preceding paragraphs set forth the exclusive remedies for claims (except as to title) based upon defects in or nonconformity of the Equipment, whether the claim is in contract, warranty, tort (including negligence), strict liability or otherwise, and however instituted. Upon the expiration of the warranty period, all such liability shall terminate. The foregoing warranties are exclusive and in lieu of all other warranties, whether oral, written, expressed, implied or statutory. NO IMPLIED OR STATUTORY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE SHALL APPLY. IN NO EVENT SHALL THE SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL, INDIRECT OR EXEMPLARY DAMAGES.

This warranty applies only within the United States.

M/A-COM

3315 Old Forest Road
Lynchburg, VA 24501
1-800-528-7711

AE/LZT 123 3248/1 R5A

BATTERY WARRANTY

- A. M/A-COM Private Radio Systems, Inc. (hereinafter "Seller") warrants to the original purchaser for use (hereinafter "Buyer") that nickel-cadmium and nickel-metal hydride batteries supplied by Seller shall be free from defects in material and workmanship, and shall conform to its published specifications for a period of twelve (12) months from the date of purchase.
- B. For purposes of this warranty, batteries shall be deemed defective if (1) the battery capacity is less than 80% rated capacity, or (2) the battery develops leakage.
- C. If any battery fails to meet the foregoing warranty, Seller shall correct the failure by issuing a replacement battery upon receipt of the defective battery at an Authorized Service Center (ASC). To obtain the name and address of an ASC, ask your salesperson, consult the Yellow Pages, or call the number printed at the bottom of this page.
- D. Replacement batteries shall be warranted only for the remaining unexpired warranty period of the original battery. This warranty becomes void if:
1. The battery has been subjected to any kind of misuse, detrimental exposure, or has been involved in an accident.
 2. The battery is used in equipment or service other than the radio equipment for which it is specified.
- E. The preceding paragraphs set forth the exclusive remedies for claims (except as to title) based upon defects in or non-conformity of any battery, whether the claim is in contract, warranty, tort (including negligence), strict liability or otherwise, and however instituted. Upon the expiration of the warranty period, all such liability shall terminate. The foregoing warranties are exclusive and in lieu of all other warranties, whether oral, written, expressed, implied or statutory. NO IMPLIED OR STATUTORY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE SHALL APPLY. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL, INDIRECT OR EXEMPLARY DAMAGES.

This warranty applies only within the United States.

M/A-COM
3315 Old Forest Road
Lynchburg, Virginia 24501
1-800-528-7711

AE/LZT 123 3248/2 R4A

OPERATOR'S RADIO SETUP

RADIO TYPE: _____

FREQUENCY BAND: _____

OPERATOR'S NAME: _____

EMERGENCY GROUP: _____

EMERGENCY NUMBERS

Police

State Police

Fire

Poison Control

Ambulance

Life Saving and
Rescue Squad

M/A-COM Wireless Systems

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Printed in U.S.A.